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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/910,914	07/24/2001	Kie Y. Ahn	M4065.0461/P461	2806
24998	7590	08/26/2004	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			FOURSON III, GEORGE R	
2101 L STREET NW			ART UNIT	
WASHINGTON, DC 20037-1526			PAPER NUMBER	
			2823	

DATE MAILED: 08/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/910,914	AHN ET AL.	
	Examiner	Art Unit	
	George Fourson	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9,11-14,16-19 and 21-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9,11-14,16-19,21-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-9,16-19,21-24,29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al '028 in view of applicant's admitted prior art (AAPA), Lopatin, Krishnan et al and Jang.

Huang et al, AAPA and Lopatin are applied as stated in the paper mailed 3/5/04.

The combination of Huang et al, AAPA and Lopatin does not include forming the barrier layer 212 of Huang et al directly on the ILD 206.

Krishnan et al discloses selective CVD of Cu in an opening in an ILD by removal of a barrier layer 24 by CMP followed by formation of the Cu layer 32 by selective CVD (fig 21-25). The barrier layer 24 is disclosed to be TiW and the ILD 16 is disclosed to be oxide.

Jang discloses formation of WN 160 within a via opening but not on the surface of the ILD 120a/120b followed by CMP of the copper to remove the Cu from the surface of the ILD. The preferability of etching as opposed to CMP is related to formation of the recessed Cu layer.

It would have been within the scope of one of ordinary skill in the art to omit formation of layer 207 of Huang et al in the process of the combination of Huang et al, AAPA and Lopatin in view of the teachings of Krishnan et al related to polishing of a barrier layer formed directly on an ILD layer followed by selective CVD of Cu and those of Jang related to formation of the structure of fig 23 of Krishan et al using the recited materials.

Claims 14 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Huang et al, AAPA and Lopatin as applied to claims 1-9,16-19,21-24,29 and 30 above, and further in view of Shachan-Diamand et al.

Shachan-Diamand et al is relied on as providing motivation to form the Cu layer of the combination suing contact displacement method.

Claims 11-13 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Huang et al, AAPA and Lopatin as applied to claims 1-9,16-19,21-24,29 and 30 above, and further in view of Kaloyeros.

Kaloyeros is relied on as providing motivation to employ low-T MOCVD as the selective CVD method of forming the Cu layer of the combination or as providing motivation to employ the source gases required by claims 12,13,26 and 27.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

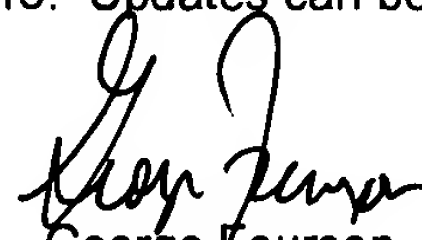
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Art Unit: 2823

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (571) 272-2800. See MPEP 203.08.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner George Fourson whose telephone number is (571)272-1860. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571)272-1855. The fax number for this group is (571)273-0224 and the customer service number for group 2800 is 571-272-2815. Updates can be found at <http://www.uspto.gov/web/info/2800.htm>.


George Fourson
Primary Examiner
Art Unit 2823

GFourson
August 20, 2004